

FALL 2009

from the California Academy of Sciences

LIVE



Look Inside:

Mapping climate change

Evidence of evolution

Journey to the Stars

Fall calendar of events



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SCIENCES

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It's hard to believe, but the new Academy building has now been open for almost a year. By any measure, it has been busy around here since opening day. Academy scientists have described dozens of new species; rainforest birds, chameleons, jellyfish, and a number of other aquarium animals have begun breeding in their displays; we launched a new Teacher Institute on Science and Sustainability for Bay Area elementary school teachers; and more than two million visitors have passed through our doors.

To thank you for your support during our inaugural year back in Golden Gate Park, we've planned a special weekend of festivities on September 26 and 27. We hope you'll join us for the chance to meet big cats and birds of prey, experience some of the Bay Area's finest dance and drumming ensembles, and check out our new planetarium show, *Journey to the Stars*.

This issue of LIVE will be the last member newsletter that you receive in its current form. In the spirit of sustainability, we will share our news and stories with you in the future on a special members-only section of our website. This new format will allow us to incorporate additional features, such as slide shows and video interviews. Keep an eye out for a postcard in December with more details and login information. In the meantime, if you don't yet receive our monthly electronic newsletter, you can subscribe at www.calacademy.org.

Greg Farrington
Executive Director

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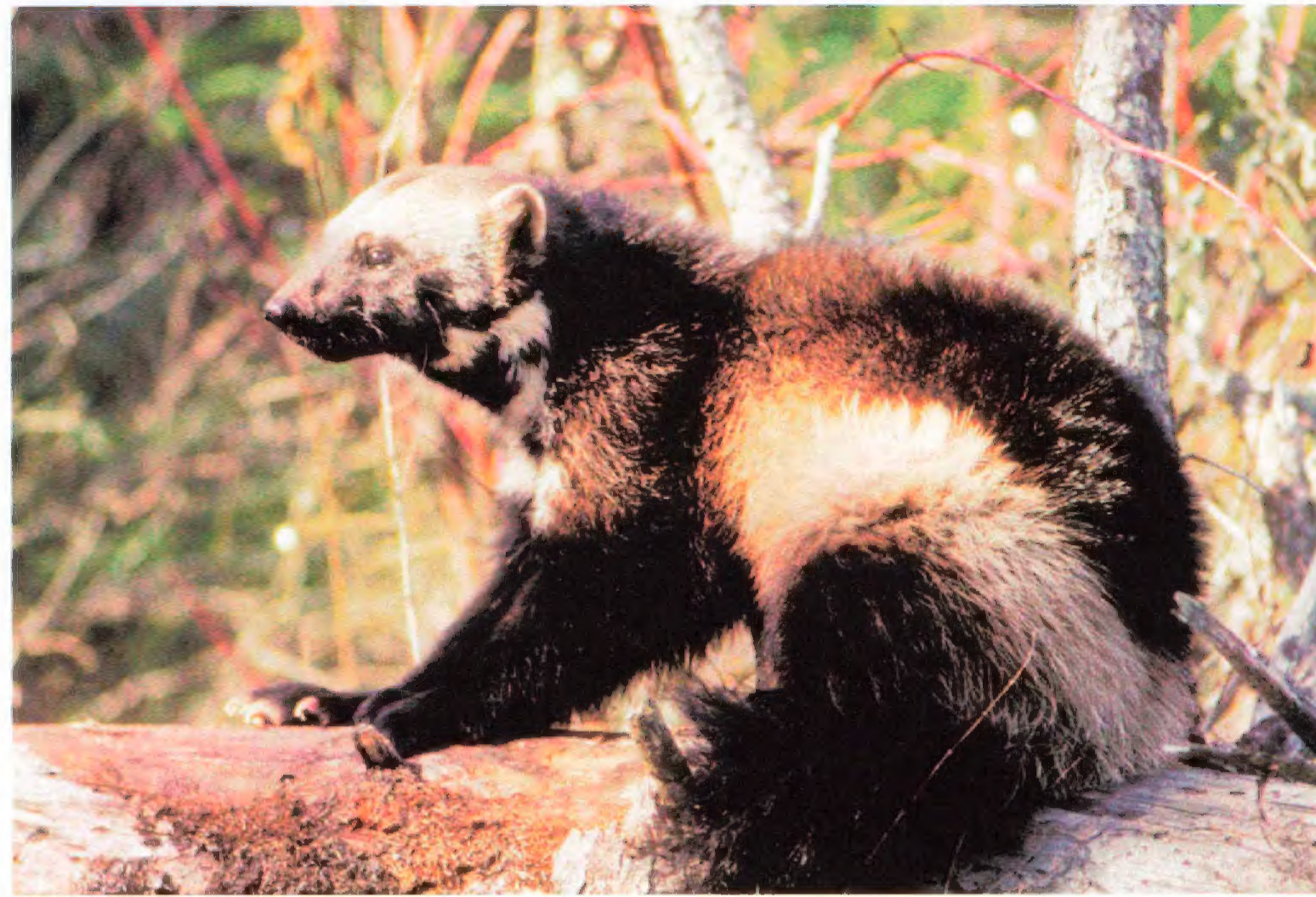
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This panther chameleon (*Furcifer pardalis*) lives in the Madagascar level of the

Academy's *Rainforests of the World* exhibit. Like almost half of the world's chameleon species, this colorful lizard is endemic to Madagascar, meaning that it is not naturally found anywhere else on Earth. Learn more on page 4. Cover photo by Kevin Twomey.

On the Back

The Death's head moth is just one of the scary specimens that will be on display in October in honor of Halloween.



Where in the World

Native to the eastern and northwestern coasts of Madagascar, the panther chameleon favors lowlands and has adapted to a degraded habitat. Approximately half of the world's chameleon species are endemic to Madagascar, living there and nowhere else. Rich in biodiversity, this island off the coast of Africa is among the world's highest conservation priorities.



Gerald and Buff Corsi (c) California Academy of Sciences

Where in the Academy

The Academy's panther chameleon is located in the Madagascar level of the *Rainforests of the World* exhibit, just across from a variety of colorful geckos. Gripping its leafy branch with the aid of V-shaped feet and a prehensile tail, it is a captivating creature to behold.

Layers of Color

Chameleons get their eye-catching coloration from melanin and chromatophore cells, lying just under a transparent outer layer of skin. Cells near the surface contain red or yellow pigment, and the lower layers contain blue or white. When the pigment shifts within the cells, different colors appear more (or less) intense.

Catching Dinner

Panther chameleons in the wild eat insects, small birds, and other reptiles, and can watch for prey in all directions with independently moving eyes. This species can capture its meal in a fraction of a second with a sticky tongue that is longer than its entire body.

Panther Chameleon

With its brilliant streaks of blue, green, red, and orange, the panther chameleon (*Furcifer pardalis*) is one of the most colorful lizards in the world. Like other chameleons, this quick-change artist can dramatically alter its appearance by changing the color palette and patterns of its skin. These changes are prompted not by an attempt to blend into its surroundings, as is commonly thought, but by shifts in temperature, mood, and light. On a cold day, for instance, a chameleon's skin may become a darker hue, allowing it to absorb more heat from the sun.

As reptiles, panther chameleons are ectothermic, meaning that they must rely on external heat sources to regulate their body temperature. Basking in the sun helps keep them warm, but evidence suggests that temperature is not the only factor at play; panther chameleons may also be adjusting their sunbathing schedules according to their levels of vitamin D, a nutrient important to reproduction.

When it comes to courtship, male panther chameleons display bold, bright stripes, and bob their heads up and down to express interest in females. While female panther chameleons are about half the size of their colorful male counterparts and have less prominent coloring, they too can accomplish a lot with a shift in skin tone. A female will turn a pale pink or orange if she is receptive to the male's advances. However, if her usual brown or green skin becomes darker and more distinct, it's a signal to stay away.

Because of their striking appearance, people have long prized chameleons as pets. Madagascar's chameleons are protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which aims to closely control the exportation of species that are or may become threatened with extinction.



Mystery Sengi

There is perhaps no group of animals with a more colorful history of misunderstood ancestry than sengis—small mammals that sport the spindly legs of an antelope, the flexible snout of an anteater, and the tail of a rat. Early taxonomists hypothesized that sengis were most closely related to shrews, since both groups of animals slurp up insects in a similar fashion. Later, scientists mistakenly grouped these unique animals with hoofed mammals, rabbits, and even primates. However, recent DNA testing has revealed that sengis are actually part of an ancient group of African animals whose closest relatives include elephants, sea cows, and the armadillo.

While their place on the mammalian family tree is now widely accepted, Academy scientists Galen Rathbun and Jack Dumbacher have uncovered a new mystery in sengi classification. There are currently 17 described species of sengis, the smallest of which, the round-eared sengi (*Macroscelides proboscideus*), is native to South Africa and Namibia. Its pelt color varies from dark brown

to light buff across its range, but—until recently—only one color morph was known from each region, so scientists thought they were seeing local variation within a single species. Then a Namibian wildlife biologist spotted a dark animal in an area that had previously been known to support only light-colored individuals. He sent the specimen to Rathbun and Dumbacher for analysis to determine if it might represent a new species. “Initial DNA sampling suggests that the dark specimen is quite genetically distinct,” says Dumbacher, “but with only one specimen, it’s hard to be sure.” To confirm their results, the scientists are planning to return to Namibia, where they hope to observe this elusive mammal in the wild and collect additional DNA samples.



Where in the World

The round-eared sengi (*Macroscelides proboscideus*) is found from northwestern Namibia to the southeastern Cape of South Africa. The newly-collected dark specimen that may represent a new species was discovered in the desert landscape of Damaraland in northwestern Namibia.

Academy Collection

The Academy has 11 round-eared sengis from northwestern Namibia in its mammalogy collection—ten with the typical buff-colored fur, as well as the darker specimen pictured here. The dark individual was collected from a gravel-strewn desert floor, about six miles from the collection site of the closest light-colored specimen.

Also Known As...

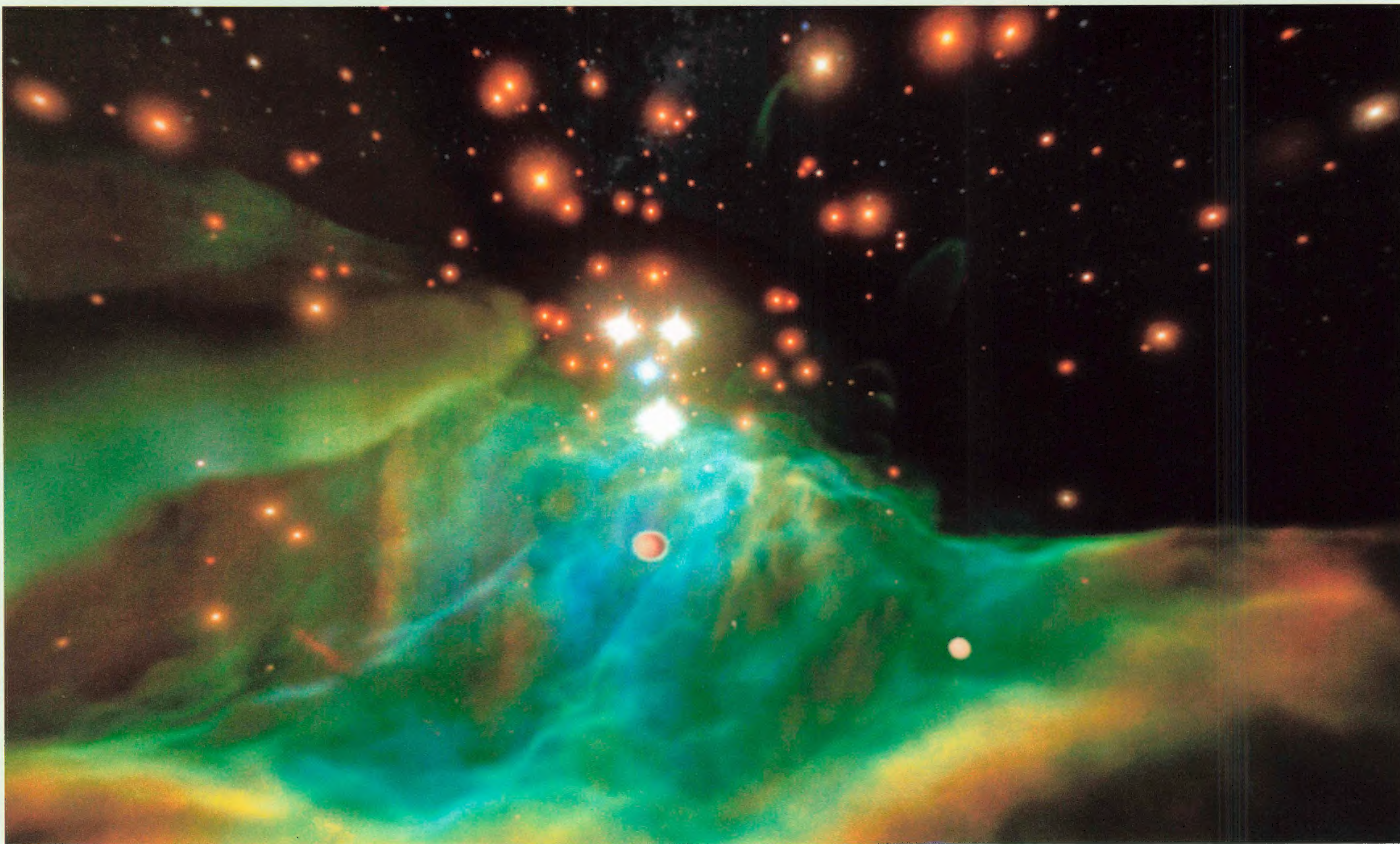
Early scientists named these animals “elephant-shrews,” not because they thought sengis were related to elephants, but because of their long, flexible trunks. Ironically, scientists now know that sengis are much more closely related to elephants than they are to shrews. In order to avoid confusion with true shrews, they now stick to “sengi” as a common name, a term derived from the Bantu languages of Africa.



Jack Dumbacher

Monogamous Mates

Although monogamy is found in less than 10 percent of mammals, sengis mate for life. While monogamous couples share overlapping home ranges, males spend little time with their mates or offspring.



Journey to the Stars

New planetarium show opens on September 26, 2009

FOR THE PAST YEAR, MORRISON Planetarium's inaugural show *Fragile Planet* has transported audiences to the Moon, Mars, and beyond the solar system in search of extraterrestrial life. On September 26, 2009—almost one year to the day since the new Academy opened—the planetarium's second space show will debut to the public, launching audiences on a different but equally spectacular cosmic journey.

Narrated by Whoopi Goldberg, *Journey to the Stars* travels through time and space to explore the dramatic lives and deaths of stars. The show begins with a sunset over the Golden Gate Bridge, then delves 13 billion years into the past, when the first stars were born. Along their journey, audiences will witness the brilliant supernova

explosions that sent new kinds of matter coursing through space, seeding the Universe with the elements necessary for life as we know it. They will also dive into the heart of the fiery Sun, where nuclear fusion occurs, and glimpse its eventual demise as it transforms into a massive red giant some five billion years in the future. By the end of the show, which depicts sunrise over downtown San Francisco, visitors will have toured stellar formations, explored celestial mysteries, and discovered the deep-rooted connection between humanity and the stars.

Like *Fragile Planet*, *Journey to the Stars* will be tailored to the all-digital planetarium's 75-foot-diameter screen and continue the tradition of facilitation by a live presenter. It will play 7-10 times a day, every day in

Morrison Planetarium until the fall of 2010. In addition, the Academy's Benjamin Dean Astronomy Lectures in early 2010 will give audiences a chance to meet the scientists who worked with *Journey's* production team. The January Dean Lecture will feature Dr. Ben Oppenheimer, astrophysicist and curator for the show. Check www.calacademy.org/events in the coming months for details.

Journey to the Stars was developed by the American Museum of Natural History, New York (www.amnh.org) in collaboration with the California Academy of Sciences as well as GOTO INC., Tokyo, Japan; Papalote Museo del Niño, Mexico City, Mexico; and the Smithsonian National Air and Space Museum, Washington, D.C.

Globetrotting in 2010 with the Academy

FROM CHURCHILL, CANADA (55° N, 108° W) in the Arctic tundra to sub-equatorial Cape Town, South Africa (34° S, 18° E), the Academy's tours in 2010 will span the globe and offer a range of experiences designed to create a deeper appreciation for the Earth and its inhabitants.

Would you like to glimpse humpback whales and sea bird rookeries while cruising along the remote and ruggedly beautiful coastline of Northwest Australia? Dr. Chris Andrews, Director of Steinhart Aquarium, will take you to horizontal waterfalls and aboriginal rock art thought to be up to 50,000 years old. What about exploring the dramatic rainforests and reefs of Belize, where you can swim with whale sharks and paddle a canoe through a subterranean cave? The Academy's Dean of Research Dr. David Mindell will help you understand the local ecology of this World Heritage site.

Invertebrate zoologist Dr. Terry Gosliner will take a group to South

Africa and Mozambique, home to some of the continent's largest wildlife reserves. "South Africa is a land of immense contrasts, with some of the richest wildlife anywhere in the world," he says. "We'll have the rare opportunity to see the Cape Floristic Province, the richest of the five Mediterranean climate regions in the world, in full bloom in the southwestern Cape." And paleontologists Dr. Carol Tang and Dr. Peter Roopnarine will team up to lead a cruise along Egypt's legendary Nile River, lined with the wonders of ancient civilization. They will talk about these sites from an ecological perspective, discussing climate change and the geology and evolution of the Nile, which still plays a critical role in Egypt's economy and culture.

All itineraries are designed on an intimate scale to provide rare access to sites beyond the reach of most tourist operations. Whatever longitude and latitude you choose to explore, you're bound to experience an in-depth, thought-provoking journey that will change the way you understand planet Earth.



Clockwise from top: Caracol in Belize; Churchill, Canada; iguana from Belize

The 2010 Academy Travel Program

Galápagos Islands aboard the *Isabela II*

Academy Leader: Bob Van Syoc
January 18-27, 2010

Belize

Academy Leader: David Mindell
April 25 - May 2, 2010

Galápagos Family aboard the *Santa Cruz*

Academy Leader: Healy Hamilton
June 20-29, 2010

Churchill, Canada

Academy Leader: Meg Burke
July 24 - August 1, 2010

Northern Australia

Academy Leader: Chris Andrews
August 6-17, 2010

South Africa

Academy Leader: Terry Gosliner
September 19-30, 2010

Egypt aboard the *Sonesta Nile Goddess*

Academy Leaders: Carol Tang and Peter Roopnarine
October 14-24, 2010

Bhutan

Academy Leaders: Greg and Jean Farrington
November 7-21, 2010

Two more adventures still in development:

East Africa and Cuba

Call (800) 853-9372 today to add your name to the priority traveler list for East Africa or Cuba!

Priority travelers will receive the first opportunity to book before these trips are publicized to all members.

For more information or to secure your space, please contact the Academy Travel Office at (800) 853-9372 or calacademy@hcptravel.com. Visit the website at www.calacademy.org/events/travel.



Mapping Our Future

Using an unprecedented amount of data, Academy scientist Healy Hamilton is working to predict the impacts of climate change on some of the most iconic species in the American West—and providing a valuable tool for conservation managers.

BY STEPHANIE STONE

IF A PICTURE IS WORTH A THOUSAND WORDS, A MAP is arguably worth a thousand pictures—especially when that map can illustrate how habitats will shift over the next 100 years in response to different levels of greenhouse gas emissions. Dr. Healy Hamilton, the director of the Academy’s Center for Biodiversity Research, is working with an interdisciplinary team of scientists to create maps that can do just that, leveraging both the museum’s extensive research collections and its state-of-the-art mapping and visualization software. While Hamilton and her team are not the first scientists to model the impacts of climate change on future species ranges, their projections incorporate far more data than those of previous models, resulting in maps that are more detailed and less uncertain. These high-resolution maps, which project the future ranges of key species under different climate scenarios on a ten by ten kilometer grid, are providing some of the first actionable data for conservation managers who must now plan for the impact of global climate change.

“We know that species are already responding to the relatively small amount of climate change we’ve experienced

so far,” says Hamilton, “so there is no doubt that species are on the move. The question is: Where will they be in 50 or 100 years, and how can we help them adapt?” The first step toward answering this question is to create what Hamilton calls a “climate envelope” for a given species. By inputting occurrence data from museum specimens collected over the past century and from field biologists tracking those same species today, Hamilton can establish the preferred environmental parameters for a given species, such as temperature and precipitation ranges.

It would be impossible to create climate envelopes for every species in an ecosystem, so Hamilton chooses key species to serve as proxies for the other members of their communities. These species are often conservation targets—charismatic or iconic plants and animals that play a pivotal role in their ecosystems. While climate change will affect species distributions across the globe, Hamilton has focused her first projections on the American West, where she has created climate envelopes for such key species as the wolverine, the Canadian lynx, the snowshoe hare, and two species of redwood trees.

ONCE HAMILTON HAS ESTABLISHED A CLIMATE envelope for a particular species, the next step is to determine where those environmental conditions will exist in the future. This is when the need for serious computing power and data storage capacity comes into play. The Intergovernmental Panel on Climate Change (IPCC) has vetted almost two dozen Global Circulation Models constructed by research teams around the world, each of which uses somewhat different techniques to predict future global climate under multiple scenarios of greenhouse gas emissions. While past attempts to predict the impact of climate change on biodiversity have leveraged just one or a few of these models, Hamilton and her team are utilizing data from 17 different models to generate “future climate surfaces” with a much greater degree of statistical confidence. The IPCC climate models, however, are built at a coarse spatial resolution, typically using a grid of 288 by 288 kilometers—much too coarse to understand climate impacts on localized plants and animals. In order to create maps at a fine enough spatial scale to be useful to conservation managers, Hamilton must “downscale” each of these 17 models, using complex calculations to fill in climate data on a higher-resolution grid of ten by ten kilometer cells. Additionally, she is mapping future climate surfaces across the globe under two different greenhouse gas emission scenarios: a pessimistic scenario in which carbon emissions continue building rapidly for the next 100 years, and an optimistic scenario in which global emissions stabilize by mid-century.

All told, Hamilton and her team have now built more than 7,000 high-resolution future climate surfaces that cover every inch of land on the planet—and have created more than a million electronic files in the process. The data storage needs for this work are so immense that Hamilton would have been unable to proceed without a hefty hardware donation from NetApp, a global data storage company based in Sunnyvale. Her new hardware system has the capacity to store over 400 terabytes of data—more than 1,000 times as much as a well-equipped home computer.

ALTHOUGH HAMILTON’S FUTURE CLIMATE SURFACES are interesting in and of themselves, they really begin to speak volumes when she overlays the “climate envelope” data from a key species to see how the range of a plant or animal is predicted to shift under both the pessimistic and optimistic scenarios for greenhouse gas emissions. “When you look at these maps, you realize it’s not just that species are

going to shift north or shift up a mountain,” says Hamilton. “Yes, in many cases that happens, but our projections show that there are also places where species exist today that should still provide suitable habitat in the future. These places, these climate refugia, should be conservation priorities.”

Indeed, Hamilton has identified a number of climate refugia for key species across the American West, some of which happen to fall within existing national park boundaries. Those refugia that are not already part of a protected area network can in many cases be targeted by conservation organizations with land purchasing or management programs. Hamilton’s projections for redwood trees provide a perfect case in point. Her pessimistic-case model for coast redwoods indicates that climate conditions will become unsuitable for these iconic trees through much of California by 2090, with the exception of a few small patches in Humboldt and Del Norte counties. “Redwood trees take a long time to die, so they won’t disappear overnight,” explains Hamilton. “But new seedlings may no longer be able to take root, and eventually those forests will be gone.” However, even under this pessimistic scenario, Hamilton has identified a climate refugium for redwoods in northern Humboldt County—an area currently carpeted in redwoods that, according to the projections, should still provide an optimal climate for the trees 100 years from now. Based on these findings, Save the Redwoods League can now evaluate land purchase opportunities in this region.

Hamilton’s projections also highlight the importance of wildlife corridors that allow species to move as their habitat shifts. In January, she presented preliminary maps for seven key species at the Western Conservation Summit, a three-day meeting hosted by the Wildlands Network that brought together such renowned scientists as E. O. Wilson, Paul Ehrlich, and Michael Soulé to discuss conservation priorities for the American West. In many cases, these species will be able to find appropriate habitat even as climate change causes their ranges to shift because of the largely-intact wilderness corridor that extends from Sonora up through the Rocky Mountains and into Alaska. For instance, although Hamilton’s pessimistic model for wolverines suggests that these fierce animals will become locally extinct in the lower 48 states by 2090, the optimistic model highlights pockets of habitat within the Yellowstone to Yukon conservation corridor where wolverines will be able to survive. “When Healy presented her preliminary models to the Western Conservation Summit, I was blown away,” says Wendy

Based on Hamilton’s findings, Save the Redwoods League can now evaluate land purchase opportunities in northern Humboldt County—an area that should still provide an optimal climate for redwood trees 100 years from now.

Francis, Director of Conservation, Science and Action for the Yellowstone to Yukon Conservation Initiative (Y2Y). “At Y2Y we are promoting a vision of interconnected protected areas through the Rocky Mountains all the way to the Arctic Circle. Healy’s models demonstrate how critically important such a vision is to creating the conditions in which animals will be able to move and adapt in response to climate change.”

Perhaps the most powerful message of all within Healy’s maps is the idea that the destiny of these species is not yet set in stone. “There are profound differences in the impacts of climate change on biodiversity depending on our future greenhouse gas emissions,” says Hamilton. “When we model under pessimistic scenarios, the outcomes reveal a world so different—the impacts will be devastating to wildlife. But if we can stabilize our emissions levels, and if we implement the right conservation measures, most species will be able to adapt.” Change, Hamilton says, will still happen. Species will still have to move. But the change won’t be as dramatic, and we’ll be able to plan for it. “If there’s one thing I want people to understand about these models,” says Hamilton, “it’s that




message of hope—that if we take steps to reduce our carbon footprint, we can create a meaningfully better future for the other species on our planet, and ultimately for ourselves.”

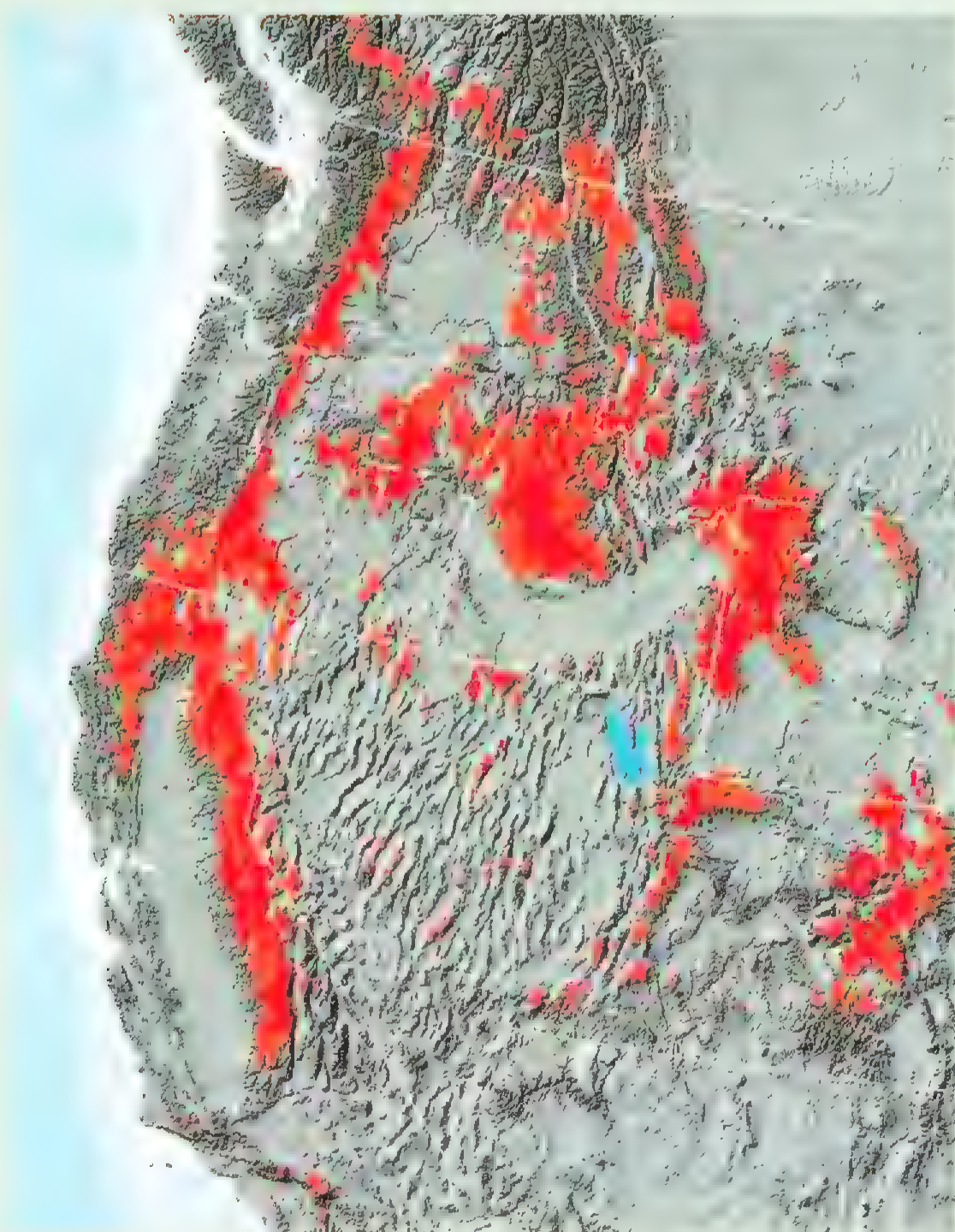
The wolverine is considered an important predator in healthy North American ecosystems.



Forecasted suitable habitat for wolverines from the present to 2090

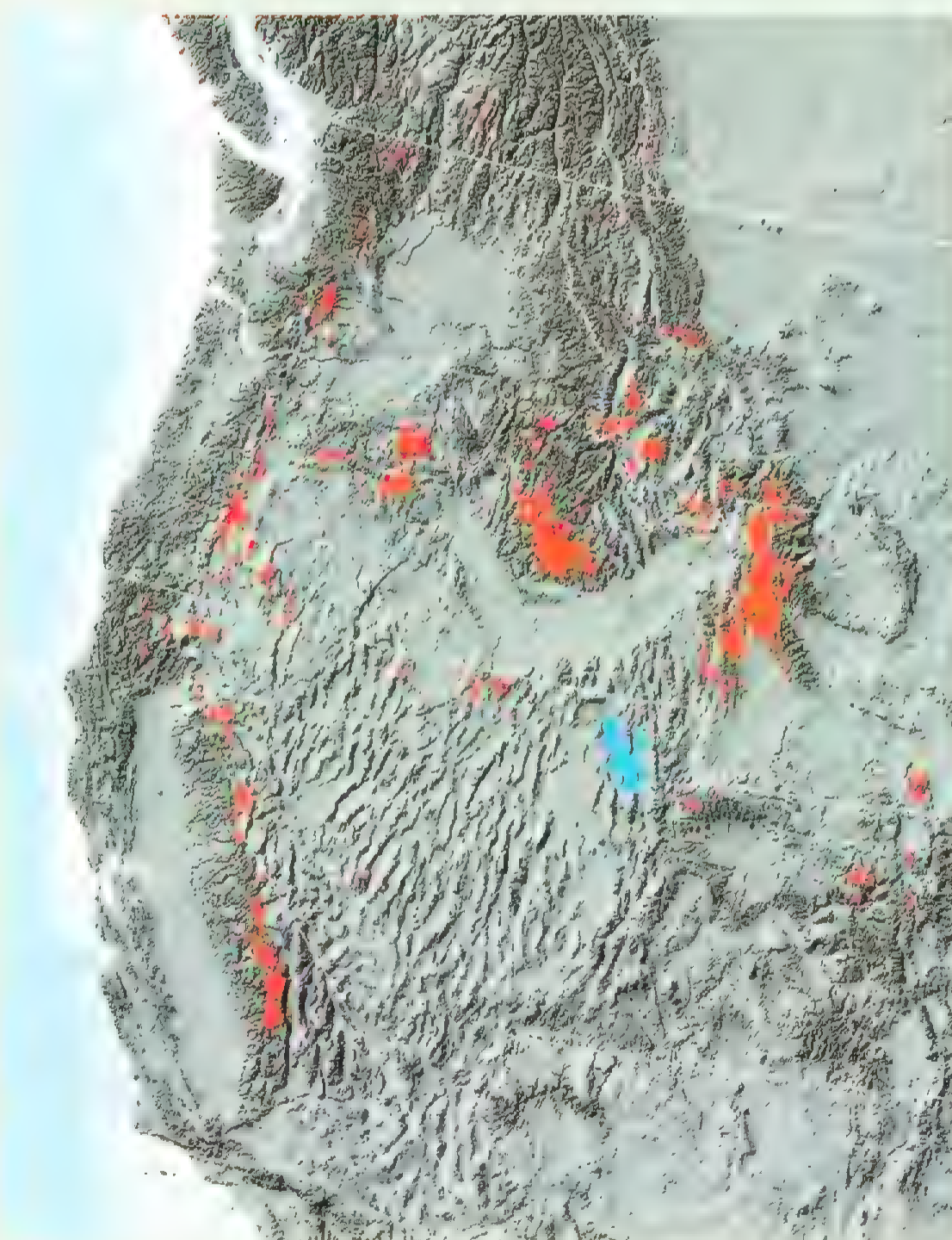
These maps use data from 17 different global climate models to forecast the current and future suitable habitat for wolverines in North America. The legend below indicates the amount of agreement between these different models in predicting suitable habitat.

 80-100% model agreement  60-79% model agreement  40-59% model agreement



Current Model

This map represents current suitable habitat for wolverines in the lower 48 states. Their actual range, however, is smaller; wolverine sightings in California are extremely rare.



Optimistic Model

Based on climate projections from 17 global climate models run under an optimistic carbon emissions scenario, this map represents potential suitable habitat for wolverines in 2090.



Pessimistic Model

Under a pessimistic scenario of carbon emissions, these same 17 climate models predict that wolverine habitat might almost disappear by 2090.

Daily and Weekly Programs

Planetarium Shows

Take place 7-10 times a day, depending on the day. Proceed to the planetarium entrance upon arrival for the day's schedule and to pick up your passes.

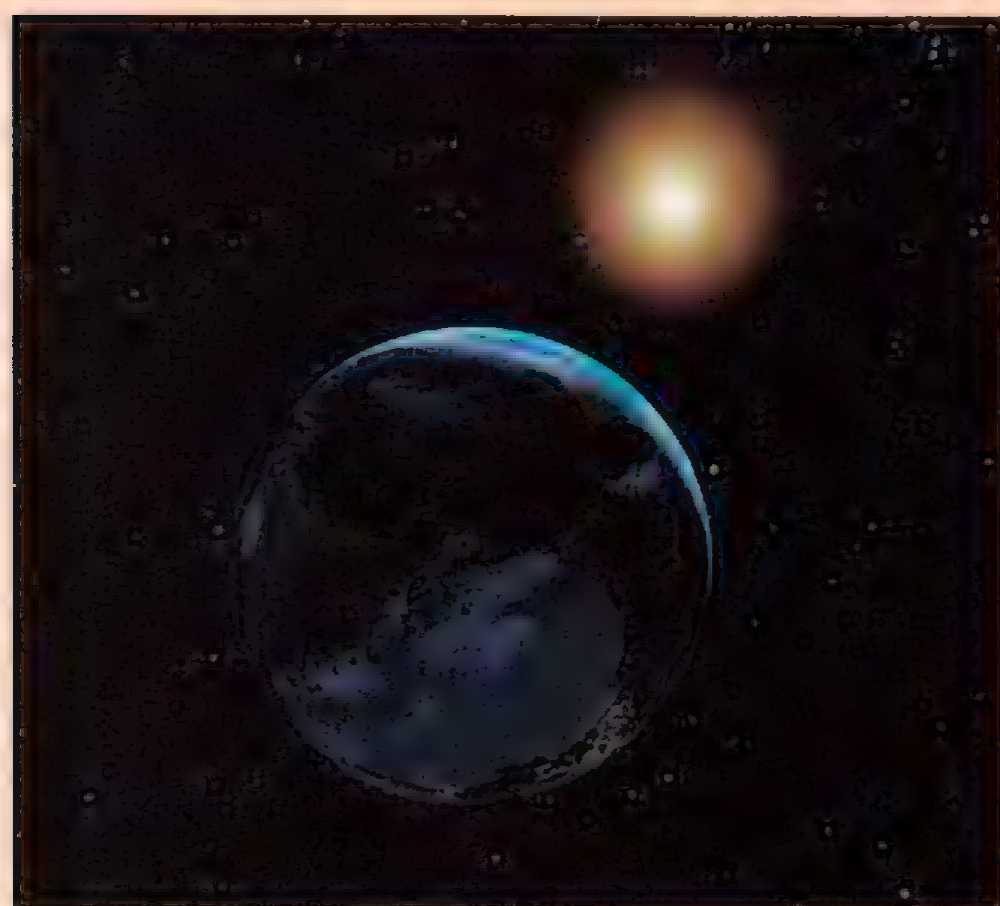
Note: Seats are limited and on a first-come, first-served basis.

Fragile Planet

Ends Friday, September 25!

Leave Planet Earth behind as you fly to the farthest reaches of the Universe in this 30-minute show. Begin your voyage at the Academy, lift off through the atmosphere to gain an astronaut's view of Earth, then travel to the Moon, Mars, and beyond to search for habitats that might support life.

Note: After September 25, Fragile Planet will continue to be shown at the weekly NightLife events.



Journey to the Stars

Starts Saturday, September 26

Travel through time and space to experience the dramatic lives and deaths of stars. Witness brilliant supernova explosions, dive into the heart of the fiery Sun, and watch it transform into a red giant five billion years in the future. Along the way, you will discover the deep-rooted connection between humanity and the stars.

Children's Story Time (ages 2-5)

Tuesdays at 9:15 am (members only)

Thursdays and Saturdays at 11:00 am

Location: Early Explorers Cove



Children ages 2-5 and their parents are invited to hear stories about the natural world. Space is limited.

Science Adventures (ages 6-10)

Sundays at 2:15 pm

Location: Education Classroom (Level 3)

Explore the natural world through stories, experiments, games, and crafts.

Science Up Close

Wednesdays at 11:30 am

Location: Naturalist Center

In these mini-presentations, find out about a different Naturalist Center specimen each week.

Bugs!

Monday - Saturday: Every hour on the hour from 10:00 am - 4:00 pm

Sunday: Every hour on the hour from 11:00 am - 4:00 pm

Location: Hearst Forum 3D Theater

Note: The 11:00 am show on Sunday is offered exclusively for members.

This 25-minute film is a remarkable foray into the insect life of Borneo. Using immersive 3D technology, *Bugs!* follows the life cycles of Hierodula, the praying mantis, and Papilio, the butterfly.

Penguin Feeding

Daily at 10:30 am and 3:30 pm

Location: African Hall

Meet Pierre, Ocio, and the rest of the African penguin colony. Aquarium biologists field visitor questions as they feed and care for the birds.



Coral Reef Dive

Daily at 11:30 am and 2:30 pm

Location: Philippine Coral Reef

Meet a diver who descends into the exhibit to introduce you to the world's deepest living coral reef tank.

Lagoon Feeding

Tuesdays and Thursdays at 3:00 pm

Location: Reef Lagoon (Level 1)

Sharks and rays are some of the most compelling and misunderstood animals on the planet. Meet the biologists of Steinhart Aquarium who care for these creatures, and uncover the facts behind the fiction.

Swamp Talk

Weekdays at 1:00 pm

Saturdays and Sundays at 11:00 am, 1:00 pm, and 3:00 pm

Find out what it takes to care for the alligator and turtles, which are native to swamps in the southeastern United States.

Family Nature Crafts

Sundays from 11:00 am - 12:30 pm

Location: Check lobby for location

Families with children ages 4-8 are invited to make nature-themed crafts.



Explore the Living Roof with a Naturalist

Mondays from 3:30 - 4:30 pm

Location: Meet in Naturalist Center

Learn about the Academy's 2.5-acre living roof and its 1.7 million native plants.

Explore Science!

Second Wednesday of the month at 3:00 pm

Location: Check lobby for location

Stop by for lively science talks and fun animal demonstrations.

Cell Phone Audio Tours

Look for this logo at certain exhibits indicating a cell phone audio tour stop.

When you dial (415) 294-3602, you will hear Academy staff sharing behind-the-scenes insights into the exhibit. This service is free except for the cost of minutes, according to your own cell phone plan.



Special Events

Celebrate the New Academy's One-Year Anniversary



It's hard to believe that one year has passed since the Academy opened its new building in Golden Gate Park. In that time, dozens of baby animals were born in the aquarium, thousands of flowers blossomed on the living roof, and two million visitors walked through the front doors.

Celebrate this amazing first year with a weekend-long celebration of science on September 26 and 27, presented

by Pacific Gas and Electric Company (PG&E). Festivities will include appearances by animal ambassadors such as big cats and birds of prey, science demonstrations, performances by renowned dance troupes, and celebratory African drumming, as well as the premiere of a new planetarium show, *Journey to the Stars*. A stage in the Academy's west garden will host headliner events throughout the weekend, and a tent in the east garden will feature additional activities and programs. Check www.calacademy.org/events for details.



Anniversary Special: Members Receive a 20% Store Discount in October

Academy members will receive a double discount (20%) on all regularly-priced merchandise in the Academy stores, as well as online at www.calacademy.org/store, during the month of October. Present your current membership card, or type in the code "member09" for online orders, to receive this double discount.

Things that Scare the Staff

Throughout the month of October, check out some of the scariest specimens in the Academy's research collections. Hand-picked by the museum's scientists, these specimens will be on display near the public Research Lab, and include such chill-inducing species as the Death's head hawkmoth—the skull-patterned moth featured in *Silence of the Lambs*.

Green Halloween Party

Friday, October 23 from 5:00 - 8:30 pm

Note: The Academy will close to the public at 3:00 pm.

The 18th Annual Family Halloween Party, presented by the Academy Guild, benefits Academy education and research programs. RSVP and purchase tickets online at www.calacademy.org/halloween or by phone at (415) 379-5411.

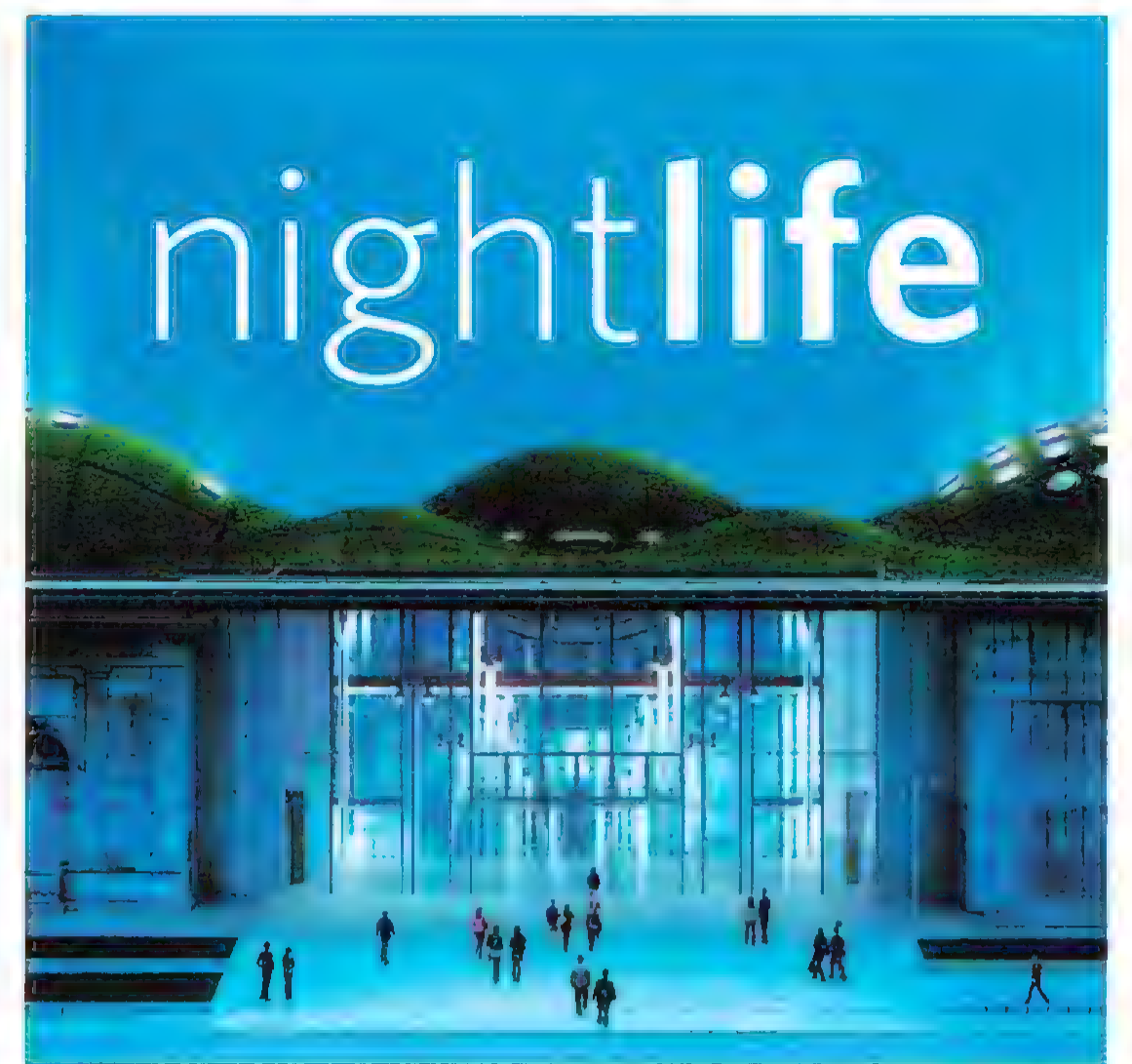


Creepy Crawly Week

Saturday, October 24 – Sunday, November 1

In honor of Halloween, face your fears and join the Academy's naturalists for lessons about creepy-crawly critters, including tarantulas, scorpions, snakes, and alligators. A special scavenger hunt will help visitors track down some of the creepiest critters in the building. Additionally, daily programs will allow you to meet—and sometimes touch—these traditionally frightening animals. You may even learn that they're not as scary as you think! A celebration for Día de los Muertos (Day of the Dead) will wrap up the week's festivities on November 1.

To learn more, visit www.calacademy.org/events.



Every Thursday from 6:00 - 10:00 pm

Note: There is no NightLife on November 26, 2009.

Gaze into the stars, get up close and personal with aquarium critters, explore art with a scientific edge, and much more during the Academy's weekly NightLife events. Tickets cost \$10 for members, \$12 non-members. NightLife is for patrons ages 21 and over; a valid ID is required for entry.

Upcoming NightLife events will include programs sponsored by the 11th Hour Project in September, as well as special presentations about the Rocky Mountain Institute and the Golden Gate Raptor Observatory in October. November programming will include author presentations in partnership with *Narrative Magazine* and a talk by the creators of *Evidence of Evolution*, a new book showcasing the Academy's specimens. Check www.calacademy.org/nightlife for a schedule of events.

New! NightLife VIP Tours

Want an entirely different NightLife experience? Take a VIP Tour. Tickets include admission to NightLife, a one-hour behind-the-scenes tour with a private viewing of the Academy's gem and mineral collection, interaction with Academy researchers in the lab, express entry into the building, an open bar in a reserved cocktail area prior to the tour, VIP access to the Rainforest, and a reserved pass for the 8:30 planetarium show. Tickets are \$59 per person; visit www.calacademy.org/visit/tours for details.

Lectures

Pritzker Lectures

Pritzker Lectures are geared toward an adult audience and feature engaging speakers from the Bay Area and beyond on topics related to the Academy's mission. These lectures take place in the Forum on Level 2.

Reservations: Free for members, \$12 non-member adults, \$10 non-member seniors. To reserve a seat or purchase tickets, visit www.calacademy.org/event_tickets or call (800) 794-7576. Seating is limited and admission is for the lecture only. Tickets for admission to the rest of the Academy are separate and optional.

Gorillas in the Mix and the Great Animal Orchestra

Tuesday, September 22 at 12:15 and 6:30 pm

Dr. Bernie Krause, Wild Sanctuary

Every living organism produces sound. This presentation will focus on the symbiotic ways in which the sounds of one organism affect and interrelate with other organisms, local and regional, within a given habitat. Learn about unusual soundscapes and their relevance to preserving natural sounds worldwide. Biophony—the notion that all sounds in undisturbed natural habitats fit into unique niches, much like the instruments in an orchestra—will be used to illustrate the ways in which animals taught humans to dance and sing.

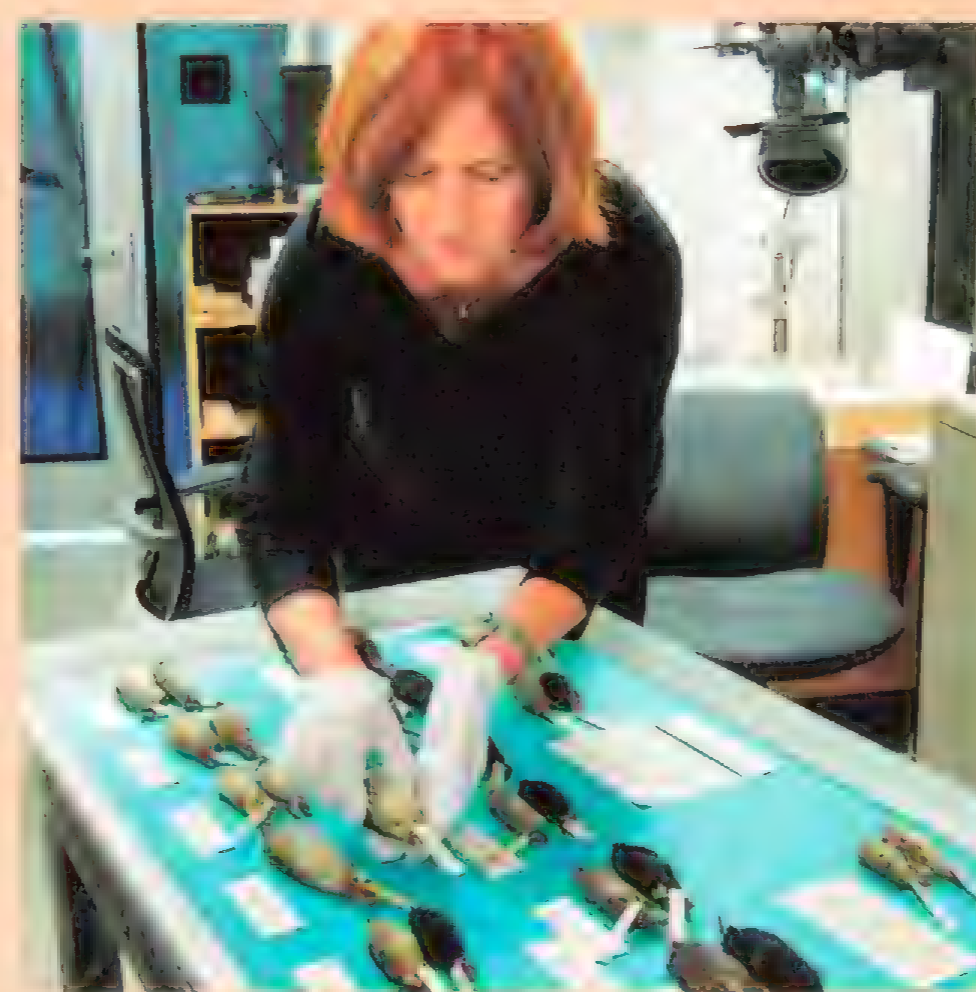


Research in the Gulf of the Farallones National Marine Sanctuary

Tuesday, October 20 at 12:15 and 6:30 pm

Speaker to be announced

This past summer, the Academy debuted the first ever webcam on the Farallon National Wildlife Refuge. Learn more about these islands and the surrounding waters off the coast of San Francisco, and what the latest research is revealing.



Evidence of Evolution: The Collections and the Book

Tuesday, November 10 at 12:15 pm

Susan Middleton, Academy research associate and photographer
Mary Ellen Hannibal, science writer, *Leaves and Pods*

This month marks the 150th anniversary of Charles Darwin's *On the Origin of Species*. To commemorate this treatise on the theory of evolution, Middleton and Hannibal have published *Evidence of Evolution*, which combines exquisite images of specimens from the Academy's own collections (from butterflies and giant tortoises to Darwin's finches) with clear text to reveal patterns of evolutionary development in animals and plants. Learn more about this evidence of evolution and the creation of "a natural history museum in a book." A book signing will follow the talk.
Note: On Thursday, November 12, Middleton and Hannibal will repeat their presentation at NightLife.

Benjamin Dean Lecture Series

This popular astronomy lecture series takes place every month inside Morrison Planetarium.

Reservations: \$6 for members, \$12 non-member adults, \$10 non-member seniors. Seating is limited. Purchase tickets in advance by calling (800) 794-7576 or online at www.calacademy.org/event_tickets.

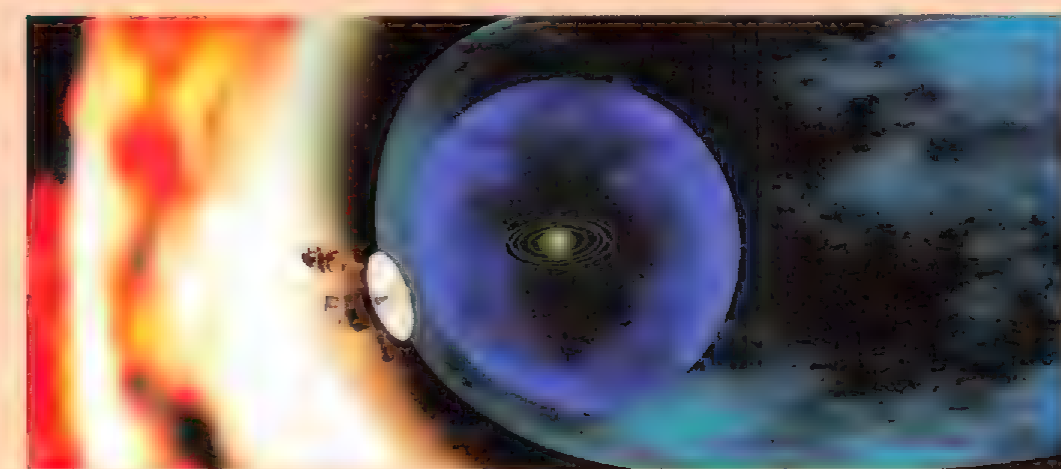
The Voyager Journey to Interstellar Space

Monday, September 14 at 7:30 pm

Dr. Edward Stone

California Institute of Technology

Launched in 1977 to explore Jupiter, Saturn, Uranus, and Neptune, the two Voyager spacecrafts revealed the remarkable diversity of these giant planetary systems. Now eight and ten billion miles from Earth, the Voyagers are exploring the outermost layer of the bubble created by the Sun as they continue their journey to interstellar space.



High-Energy Sources in Space

Monday, October 19 at 7:30 pm

Dr. Lynn Cominsky

Sonoma State University

Dr. Cominsky will discuss her research on high-energy sources in space, particularly gamma-ray bursts, pulsars, and active galactic nuclei.

The Brightest Supernova Ever Detected

Monday, November 2 at 7:30 pm

Dr. David Pooley

University of Wisconsin-Madison

Join the co-discoverer of SN 2006gy as he describes why it has been called a "hypernova," a "quark-nova," and "the brightest supernova ever detected."

BioForum Series

Join renowned scientists and fellow educators for the 25th annual BioForum, a seminar series focused on current science topics. Starting this year, related articles, lessons, and symposia video footage will be available online.

Note: This event is restricted to current science teachers.

Genomics: Insights and Impacts
Saturday, October 3 from
9:00 am - 3:00 pm

Moderated by Dr. Brian Simison,
Curator of Comparative Genomics

The current renaissance in the biological sciences is spurring the growth of new fields like functional and comparative genomics. These fields are transforming the way scientists look at life, and are revealing insights into evolutionary biology, medicine, developmental biology, and many other areas. Join a discussion about genomics, compelling current research, and the future of this rapidly advancing field.

Reservations: \$25 for current science teachers (coffee and lunch included). Advance registration is required at www.calacademy.org/teachers or (800) 794-7576. Questions? Call (415) 379-5105.

Book Discussions

Bookworms is a book discussion group for adults. Space is limited; advance reservations are encouraged.

Reservations: Free. To reserve a space, visit www.calacademy.org/event_tickets or call (800) 794-7576. Meet at the Business Reception Desk off the Middle Drive entrance.

Science Made Fun

The Canon: A Whirligig Tour of the Beautiful Basics of Science by Natalie Angier
Tuesday, September 15 at 6:30 pm

Join a discussion of Angier's primer on scientific topics, ranging from thinking scientifically to geology, astronomy, and evolutionary biology. A *New York Times* columnist and Pulitzer Prize-winning journalist, Angier asked scientists, "What do you wish everyone knew about your field?" The results are in *The Canon*.

Randomness, Chance, and Probability
The Drunkard's Walk: How Randomness Rules Our Lives by Leonard Mlodinow
Tuesday, October 13 at 6:30 pm

What role do numbers play in people's daily lives? How does one interpret chance events and how do they impact future behavior in a particular situation? How reliable or unreliable are wine

ratings, political polls, and school grades? Physicist Mlodinow's book on predictability—or the lack thereof—is sure to challenge some of your views.

Sharks and the Farallones

The Devil's Teeth: A True Story of Obsession and Survival among America's Great White Sharks by Susan Casey

Tuesday, November 3 at 6:30 pm



The Farallon Islands, inhospitable and dramatic, are feeding grounds for sharks. The book group will discuss Susan Casey's account of two biologists who have spent years in this outdoor lab observing and learning more about the behavior of these creatures. See the Academy's live Farallones webcam right now at www.calacademy.org/webcams/farallones.

Members Receive a 10% Discount on SharpShooter Photos

Take home a memento the next time you visit the Academy. Get your picture taken by a SharpShooter representative at the main entrance or the shark jaw model near the Swamp, and present your membership card for a 10% discount when you purchase your photo on site.

Membership Card Reminder

To help the Academy conserve resources, remember to retain your membership card as long as your membership is active. When you renew each year, you will use the same card. Please note that there is a \$5.00 fee per membership to replace lost or stolen cards.

Drop-in Activities

Naturalist Center

Located on Level 3, the Naturalist Center is your stop for questions about the natural world. Browse the latest science books and magazines, test your knowledge with puzzles and games for ages eight and up, surf one of the recommended websites, and view a wide variety of natural history specimens. In addition, mystery boxes on skulls, corals, tidepools, and chocolate allow self-guided exploration and learning. You can also participate in one of the Academy's citizen science projects—pick up kits and instructions for the Bay Area Ant Survey or the Bay Area's Most Wanted Spider.

Early Explorers Cove

Take your scientist-in-training to a special exhibit designed especially for children ages five and under and their caregivers. *Early Explorers Cove* is divided into three themed activity areas: the Academy Schooner and California Backyard provide role-playing scenarios where stuffed animals and puppets fill out the cast of characters, while the Coral Reef area contains puzzles, building materials, and hands-on science. Open daily during member and public hours.





Evidence of Evolution

A new book uses specimens from the Academy's research collections to illustrate one of the most central concepts in modern science.

BY STEPHANIE STONE

THIS NOVEMBER MARKS THE 150TH anniversary of a major milestone in the history of science—the publication of Charles Darwin's *On the Origin of Species*. Despite the fact that he was in many ways ahead of his time, Darwin surely could not have predicted the many advances that his manuscript would eventually make possible. Over the past century and a half, scientists have leveraged the basic principles of evolution to develop groundbreaking applications in a wide variety of fields, including health care, agriculture,



biodiversity conservation, and even law enforcement. Indeed, the findings of evolutionary biology are now so thoroughly woven into the fabric of today's culture that it would be impossible to unravel them.

To commemorate Darwin's famous treatise on the theory of evolution, Academy research associate and photographer Susan Middleton teamed up with science writer Mary Ellen Hannibal to create a new book—a collection of exquisite photographs of Academy research specimens that reveal patterns of evolutionary development

in plants and animals. These images, which range from colorful beetles and butterflies to ancient denizens of the deep sea, are accompanied by a clear, accessible overview of the key evolutionary concepts that explain life on Earth. A coffee table book that blends science and art to express Darwin's ideas in a powerful new way, *Evidence of Evolution* will hit bookstores across the country on October 1. In the interview that follows, author Mary Ellen Hannibal talks about the inspiration for the book, the process of collaborating with Academy

scientists, and the evolutionary history of thorns and prickles.

SS: As both the author of *Evidence of Evolution* and the founder of Evolve 2009, San Francisco's city-wide celebration of the Darwin anniversaries, you have spent more than a few hours over the past year talking about evolution. Why is this subject a priority for you?

Mary Ellen Hannibal: Darwin's paradigm-shifting idea is regularly invoked in discussions of how life on Earth began, but it is perhaps much more important to understand what it reveals about how life

continues. Two centuries after Darwin's birth, our world is confronted with unparalleled conservation imperatives. The diverse array of species on our planet, the raw materials of evolution, are every day more threatened by human-caused climate change. All of us need to better appreciate the linkages that make life possible, to develop reverence for our fellow organisms. That's why Susan and I wanted to produce *Evidence of Evolution*. We wanted to make Darwin's ideas concrete and show how scientists are continuing his work today.

How did you decide which of the Academy's 26 million scientific specimens to include in the book?

We think of the word as meaning change, but evolution is from the Latin *evolvere*, to unfold, and so did the process of this book unfold. Susan and I began by interviewing over 20 curators at the Academy, the working scientists at the museum who study evolution every day. Taken together, the Academy's scientists are as diverse as a tray of beetles, but they do share some defining characteristics. They are all uniformly and infectiously enthusiastic about their work. Passionate is the word. They pulled out specimen after specimen—each one a favorite—and pointed out their adaptations and evolutionary relationships. As we went along, Susan and I bemoaned the space and time limits on our project. We absorbed enough information to fill a book four times the size of this one. Wonderful evolutionary stories inevitably wound up on the proverbial cutting room floor. However, we ended up with 95 images of specimens that are both visually arresting and have amazing stories to tell.

You had to take a crash course in evolution to write this book. How did it feel to be a student again?

The Academy's scientists are all natural teachers; they make it fun to learn. One of our first lessons came from John McCosker, curator of aquatic biology at the Academy, who took us to the anglerfish in the aquarium, and—using a holographic device—induced this tricky lady to shoot out her lure at us. The lure was a highly modified dorsal fin, an example of the spectacular adaptations evolution can produce. Over a sushi lunch, John explained the unique evolutionary

theater of the marine environment. Fish move through water like birds fly through air, but never have to land on a fixed surface. They live in a hyperspace covering more than 70 percent of the planet's surface. At one point, chopstick of sustainably-harvested tuna poised above his plate, John said, "I LOVE fish!"

I still smile remembering how Tom Daniel, one of the Academy's botany curators, explained to me that a thorn is a modified branch, a prickly is a modified epidermal hair, and a spine is a modified leaf. He illustrated the definitions by showing me specimens, and then he quizzed me: "Hair is an aid....?" "Against predation!" I think I shouted it.

Of all the specimens you wrote about, which were your favorites?

Maybe the Academy scientists are rubbing off on me, because I can't pick favorites, but I can share a few examples with you. Entomology curator Dave Kavanaugh pointed us to Darwin's hawkmoth—a famous example of co-evolution between plants and pollinators. Darwin predicted the existence of this moth in 1862, when he was presented with an orchid from Madagascar with an amazingly long "spur." Darwin correctly opined that a moth with an equally long proboscis must exist to pollinate the flower; the *Xanthopan morgani praedicta*, sporting a schnozz up to 14 inches long, was discovered in 1903.

Norm Penny, another entomologist, showed us the rare gyandromorph specimen of the California dogface butterfly—nobody really knows what genetic mix-up resulted in this half-male, half-female mutant. As more than one scientist mentioned, evolution is not so much a neat equation as a messy recipe.

Invertebrate zoologist Rich Mooi utterly beguiled us with revelations about the seemingly somnambulant sand dollar, which is actually constantly engaged in the arduous task of staying put in turbulent waters—we used the example to illustrate adaptation to the environment. Every specimen in the book has a similarly captivating story to tell.

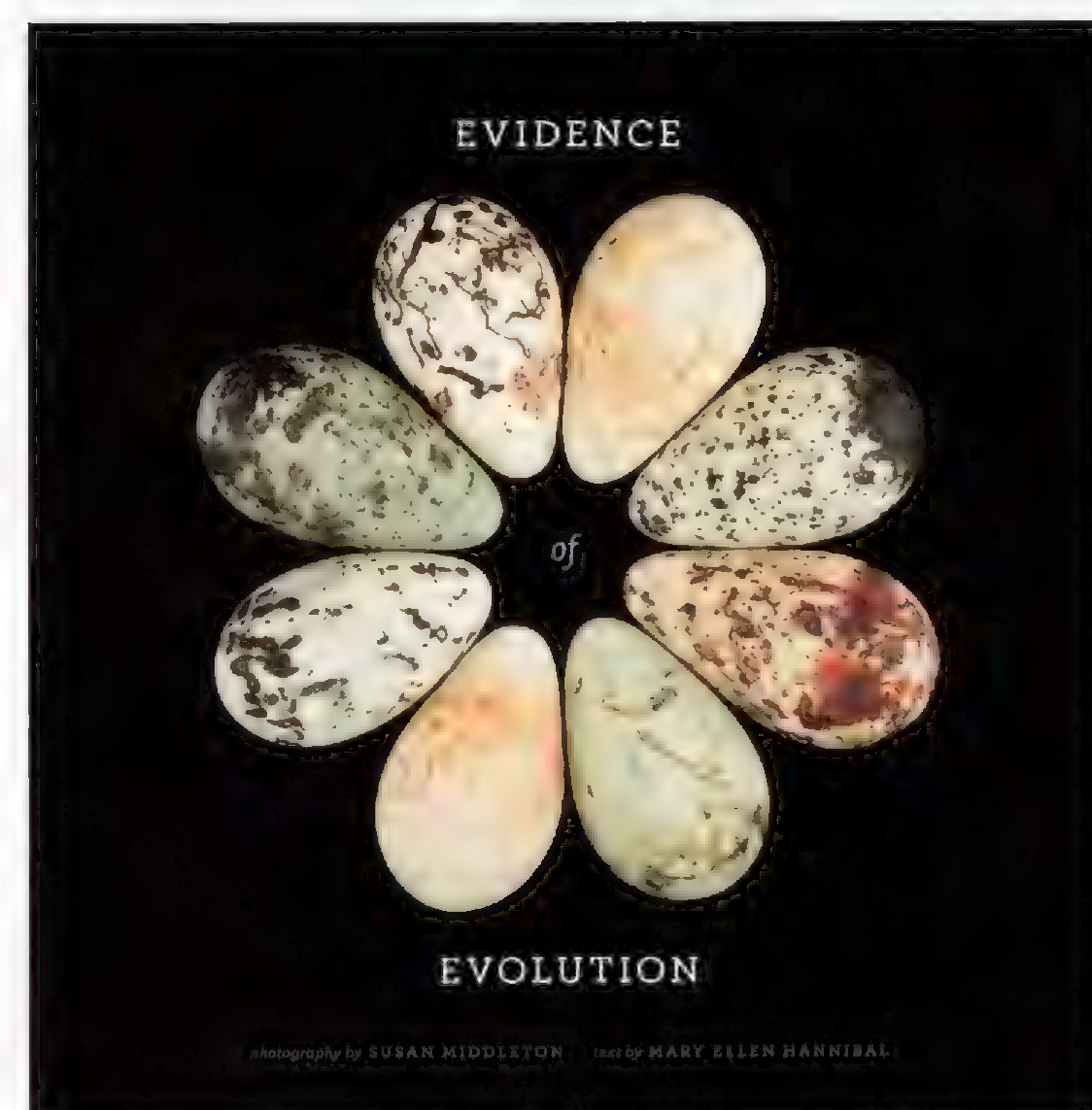
What did you learn about how museum scientists are continuing Darwin's work today?

One thing that's clear is that Darwin's work is far from over—scientists are

still discovering new species every day. Academy herpetologist Jens Vindum showed us a number of newly discovered frogs and lizards from Myanmar, many of which are the "holotype," or quintessence of their kind and the standard to which all subsequent specimens of the same species will be compared. These specimens, like the rest of the 26 million resources in the Academy's specimen library, are like photographs, capturing their moment in time. Since like all life forms they are composed of DNA, specimens contain a practically immeasurable dimension of information—what we know about them depends mostly on the changing nature of what we know to ask about them.

What Susan and I understood more deeply as our book unfolded is that Academy scientists are doing nothing less than transcribing the book of life. As John McCosker puts it, "We are identifying life on Earth—assigning names to all of the nouns and mapping the relationships between them. You have to get the nouns right, or the adjectives, verbs, and adverbs don't make any sense."

As for the collective work and passion of the scientists at the Academy, I think entomologist Brian Fisher said it best: "Science is discovery, and you get hooked on it." Susan and I sincerely hope our book helps spread the contagion.



Susan Middleton and Mary Ellen Hannibal will speak about their book at the Academy on November 10 and 12. For more information, see page 14. Evidence of Evolution will be available for purchase in the Academy Store and online at calacademy.org/evidence beginning October 1, 2009.

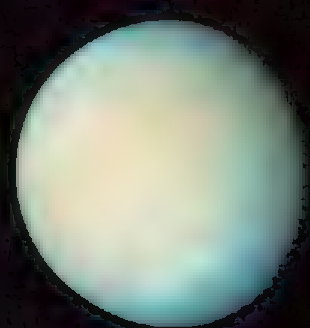
skyguide



Mercury

36 million miles
from the Sun

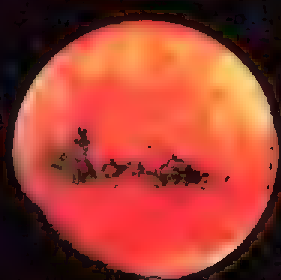
At the beginning of September, Mercury is already descending toward the setting Sun and is barely visible very low in the west just after sunset. Mercury is hidden by the glare of the Sun from the second week of September to the end of the month, when it moves to the morning sky in the company of Saturn and Venus. Watch for the three planets clustering tightly in the east before dawn during the second week of October. Mercury then retreats back toward the Sun, disappearing from view as it nears superior conjunction on November 5.



Venus

67.2 million miles
from the Sun

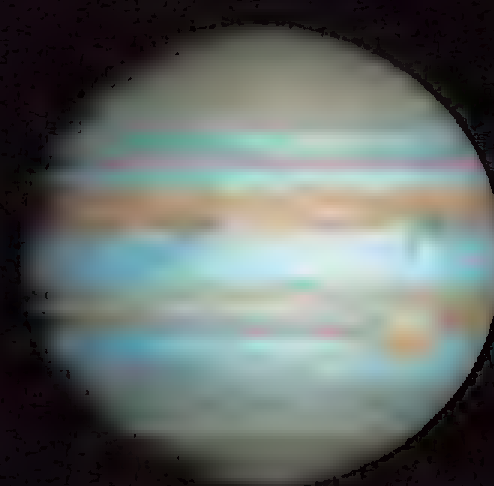
Venus is a morning object all season, rising in the east a couple of hours before dawn and gradually moving from Cancer into Leo and then into Virgo. Watch from morning to morning as it passes near the "Beehive" star cluster on September 1 (look with binoculars), near the bright star Regulus on September 20, near Saturn on October 12 and 13, and more distantly near the star Spica on November 3. The waning crescent Moon pairs up with Venus on the mornings of September 16, October 16 (with Saturn nearby), and November 15.



Mars

141.6 million miles
from the Sun

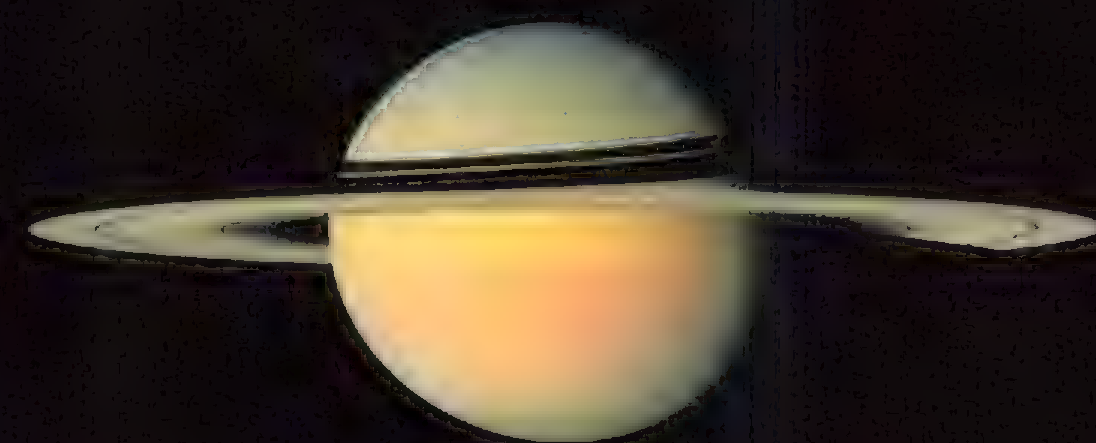
A morning object all season, the Red Planet wanders eastward from the stars of Gemini the Twins to between those of Cancer and Leo. Rising after 1:00 am in early September, it rises slightly earlier each night and is up by midnight in November, climbing high to the south by dawn. Look for the Moon near Mars on the mornings of September 13 and October 12, and on the evening of November 8.



Jupiter

483.6 million miles
from the Sun

Having passed opposition in August, Jupiter rises at sunset at the beginning of September, lingering against the stars of Capricornus and dominating a part of the sky known as the "Heavenly Waters," which is populated by aquatic constellations and fairly empty of bright stars. Rising with the constellations about four minutes earlier from night to night, Jupiter hardly moves against the stars all season. Watch the Moon pass by on the evenings of September 1, 2, and 29, October 26, and November 23.



Saturn

886.7 million miles
from the Sun

The Ringed Planet vanishes into the glow of the Sun in early September and is in conjunction with the Sun on September 17. It doesn't become visible again until the end of September, peeking up in the east just before dawn. It pulls far enough away from the Sun to

be seen clustering with Mercury and Venus in early to mid-October. The Moon's pass near Saturn on September 18 is too near the Sun to be seen, but more visible are its passes on the mornings of October 15 and 16 (with Venus and Mercury) and November 12.

First to Saturn

Thirty years ago on September 1, 1979, NASA's Pioneer 11 became the first spacecraft to fly past distant Saturn. Since that time, three other spacecraft have followed it—Voyagers 1 and 2, which both continued out of the solar system, and Cassini, which has been orbiting the ringed planet since 2004.

	Sunrise	Local Noon	Sunset
September 1	6:40 am PDT	1:09 pm PDT	7:38 pm PDT
October 1	7:06 am PDT	12:59 pm PDT	6:52 pm PDT
November 1	6:35 am PST	11:53 pm PST	5:11 pm PST

Times are for San Francisco, CA, and will vary slightly for other locations.

Happy Anniversary
On November 8, 1952, the original Alexander F. Morrison Memorial Planetarium opened to the public at the California Academy of Sciences.

A New Frontier
Sputnik, the first artificial satellite of Earth, was launched from the Soviet Union on October 4, 1957, ushering in the Space Age.

Ice on the Moon?



Since June 23, NASA's Lunar Reconnaissance Orbiter (LRO) has been circling the Moon at an altitude as low as 31 miles and imaging its surface. Launched aboard the same rocket, another NASA vehicle called LCROSS (Lunar Crater Observation and Sensing Satellite) has been gradually modifying its trajectory to a polar orbit, in preparation for an impact on the Moon's south pole in early October. Evidence from previous vehicles suggested the possibility of water at the lunar pole in the form of ice mixed with soil. With luck, LCROSS's impact may raise plumes of ice-laden debris that will be observed from both Earth and LRO. NASA planners believe that if found in abundance, water ice can be used to supply a future lunar base and even manufacture rocket fuel.

Galileo's Blunder

On September 23, 1846, the planet Neptune was discovered. Mathematical calculations had indicated that the orbit of Uranus was being affected by the gravitational influence of another, as-yet-unknown body. Credit for the discovery usually goes to Johann Galle, using calculations by Urbain Le Verrier. Though Galileo's notes show that he actually saw Neptune while observing Jupiter in 1612, he thought it was a star and so is not credited with its discovery.

Skywatcher's Guide (September - November 2009)

September 4

Full Moon located between the major stars of Aquarius the Water-Carrier and Pisces the Fishes. The Native American Choctaw tribe called it the "Mulberry Moon," the Ojibway called it the "Wild Rice Moon," and the Cherokee called it the "Month of the Nut Moon."

September 18

New Moon at 11:43 am PDT. The first visible crescent after new won't be seen from the U.S. until sunset of the 20th, marking the start of the month Shawwal in the Moon-based Islamic calendar. On the other hand, the Jewish calendar does not require actual observation of the first crescent, so new Moon dates are determined mathematically. The Jewish new year, Rosh Hashana, is celebrated on the first full day after new Moon, on the 19th.

September 22

Autumnal equinox at 2:22 pm PDT. Autumn begins in the Northern Hemisphere. In the Southern Hemisphere, it's the start of spring. The Sun rises due east and sets due west, theoretically spending equal amounts of time above and below the horizon on this day.

October 3

Full Moon. As the first full Moon after the autumnal equinox, it is also known as the "Harvest Moon." Other traditional Native American names for the full Moon of October include "Moon of the Changing Season" (Lakota Sioux), "Falling Leaves Time" (Nez Perce), and the "Turkeys Moon" (Natchez).

October 8

Peak of the variable Draconid meteor shower, although the light of a waning gibbous Moon may interfere with viewing.

October 17

New Moon at 10:32 pm PDT. The first visible crescent after new is visible from the southern United States on the evening of the 19th, marking the start of the month Dhul-Qi'dah in the Islamic calendar.

October 21

Peak of the Orionid meteor shower, which enjoys favorable viewing conditions this year, with the Moon a waxing crescent. Observers should be able to make out the typical 30-35 swift meteors per hour between midnight and dawn, often half of them leaving glowing trails. These meteors are dust particles cast off by Halley's Comet.

October 26

Spring equinox...on Mars.

November 1

End of Daylight Saving Time. Most U.S. clocks are adjusted backward one hour at 2:00 am.

November 2

Full Moon, also called the "Hunter's Moon," since it follows last month's "Harvest Moon." The Algonquin called November's full Moon the "Beaver Moon." To the Osage, it was the "Raccoon Breeding Moon," and to the Cheyenne, it was the "Freezing Moon."

November 16

New Moon. Naked-eye sighting of the first thin crescent after new marks the start of Dhul-Hijjah in the Islamic calendar. For North American observers, this sighting is expected to be possible at sunset on the 18th.

November 17

Peak of the Leonid meteor shower, an occasionally major display that puts on a spectacular storm-level show roughly every 33 years—the last time in 2002. Occurring with a new Moon, this year's shower is favored by ideal viewing conditions. Although its intensity has decreased to non-storm levels of 15-20 per hour, one never really knows what a meteor shower will do...

Q & A

Insiders Tell the Best Stories

Curiosity, discovery, and creativity fuel excitement every day in the Academy. That's one reason the Academy receives such enthusiastic support from educational philanthropists Tad Taube and Susan Koret, and technology pioneer Judy Estrin.



Photo: Sharon Beals

Through his involvement in the Koret and Taube Foundations, Tad Taube joins Koret Board Chair Susan Koret in funding a wide array of community causes in the Bay Area and abroad. What puts the California Academy of Sciences high on their priority list? A past, present, and future commitment to education and research.

Q: Both the Taube and Koret Foundations are longtime supporters of educational reform, and the Koret Foundation has funded the Careers in Science Intern Program for many years. How does the new Academy fit with your interests in civic engagement and institutions?

A: More than 300 Bay Area community organizations receive our support, and we are particularly committed to educational causes. We have become involved with a lot of educational institutions. As a major teaching and learning experience for anyone who enters its doors, we consider both the Academy and its programs very important players in educational outreach.

Q: The Academy's new Koret-Taube Education Center was named in honor of your significant support of the recent capital campaign. What is your favorite feature of the Center?

A: I most appreciate the Center's classes, workshops, and symposia that help teachers better integrate science into curricula. A Center could just be a room with lots of books and equipment, but what really matters at the Academy is putting all that into motion for teachers and their students.

Q: The Center is a collaborative effort between the two foundations. What were your goals in supporting the Academy, and how did you come to work together on this project?

A: The two foundations collaborate when we share a similar view about an opportunity or when funding requirements are very large. Ultimately, the most important element is leveraging impact. Because the Academy is such an important community resource, so consistent with our mission, there was a lot of enthusiasm among our board members to support it. Susan Koret has been a vocal proponent of the vision of her late husband. We really learned about educational reform together—"on the job training," if you will.

Q: Do you have any favorite personal experiences with the Academy?

A: My childhood years were spent in Poland, but I've experienced the Academy through three generations of my own children, now aged 6 through 52. Visiting Steinhart Aquarium was a popular family pastime, and I remember celebrating several birthdays in the interim facility on Howard Street. The Academy provides such a wonderful venue for family learning.

To learn more about giving opportunities, call (415) 379-5410 or visit www.calacademy.org/give.



Judy Estrin
CEO, JLABS, LLC

You might call Judy Estrin an expert on creativity. A pioneer in launching and growing the computer networking industry, she helped develop the software that would create the Internet and World Wide Web. She's been honored three times on *Fortune Magazine's* list of the 50 most powerful women in American business and is the author of *Closing the Innovation Gap: Reigniting the Spark of Creativity in a Global Economy*.

What is the relationship between science and creativity?

Some people think that science and creativity are mutually exclusive, with science being logical and data-driven while creativity is associated with the arts. But questioning, curiosity, and exploration are key elements of scientific and technological discovery as well. That's creativity.

You've been a generous annual supporter of the Academy's Collectors' Society. What excites you about the Academy?

As I was finishing my book, I read an article about the groundbreaking of the new Academy. I was so inspired by the green architecture, the notion of having researchers working together and an environment where people could get excited about the fun and awe of science.

What is your favorite feature of the Academy, and why?

It would have to be the penguins! I love how Academy staff designed a special wetsuit for the oldest penguin and how we can go on the web and watch them through a live feed.

Through personal interaction with Academy scientists, educators, and partners, opportunities to engage with the natural world abound.

① The Academy partnered with OceanHealth.Org and Surfrider at Ocean Beach for the annual World Oceans Day beach cleanup.

② Sarah Wells and Rashim Khadka of the Careers in Science program explain beetle identification on the public floor.

③ Laura Jensen, winner of the Academy's "VIP in the Sea" sweepstakes, dove into Monterey Bay inside the Super Falcon submersible.

④ On July 2, NightLife visitors were treated to BELLA GAIA, a show combining live music with immersive visuals in the planetarium.

⑤ Platinum Behind-the-Scenes Tour participants interact with an ornithologist in the Research Lab.

⑥ Members of the inaugural Teacher Institute on Science and Sustainability (TISS) participate in a "Fragile Coral Reef" workshop.

Upcoming Fall Donor Events

Call (415) 379-5400 for details.

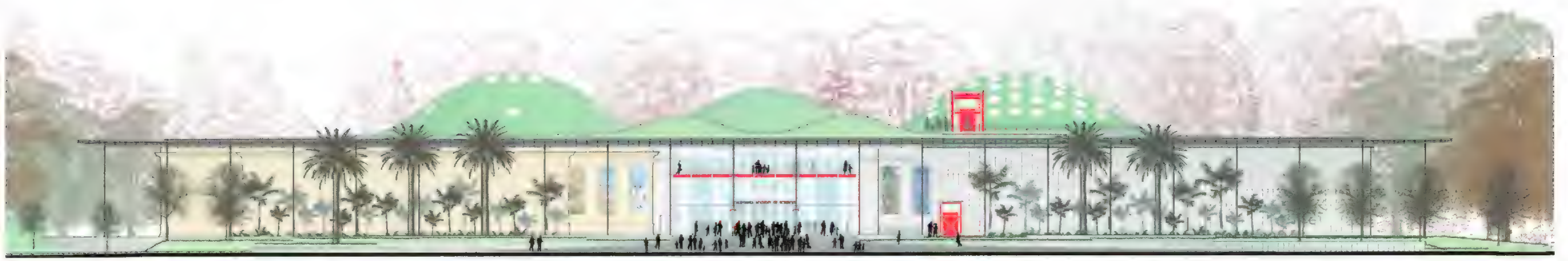
Second Annual Big Bang Gala

Friday, September 25
6:00 pm - 1:00 am
Note: The Academy will close to the public at 3:00 pm.

Film Screening for Academy Guild

Munday, October 5
6:00 - 8:00 pm





Building a Legacy

The new California Academy of Sciences has now been open for nearly a year. As it approaches this milestone, the Academy gratefully acknowledges the following donors for their contributions to the Campaign for the New Academy.

MAJOR DONORS

(contributions of \$50,000+ received August 15, 2008 - June 30, 2009)

Scott Cook and Signe Ostby; Jean and James Douglas; Ernst & Young; Tully and Elise Friedman; Louise and Mark Gaumond; John and Marcia Goldman Foundation; Kreitzberg Family Foundation; Bill and Jean Lane; Barbara and David Roux; The Niels Schultz Family; Nancy and Sidney Unobskey; Robin and Marsha Williams and Family

COMMUNITY DONORS

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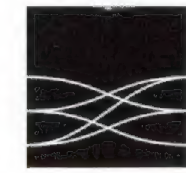
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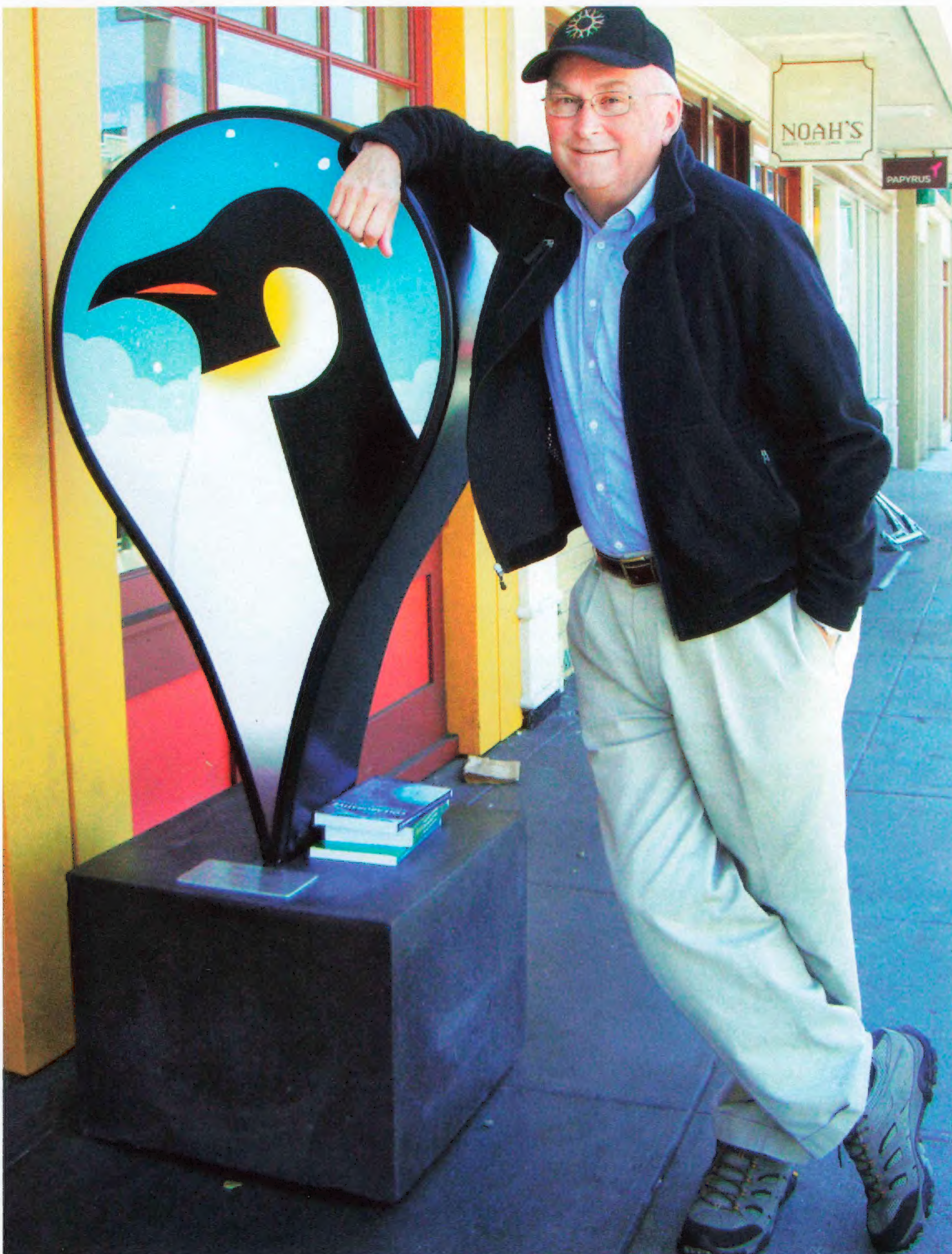
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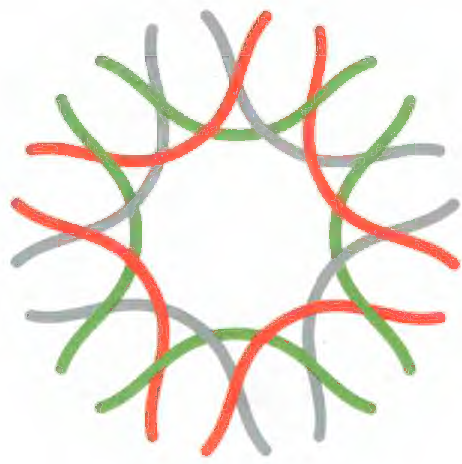
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Google Favorite Places



Gavin Newsom and Maya Lin select the Academy as a "Favorite Place" in San Francisco.

On July 15, Google launched its Favorite Places initiative—an addition to Google Maps in which 200 luminaries from more than a dozen cities selected their favorite hometown restaurants, shops, and attractions. The Academy was chosen as a favorite spot by both San Francisco Mayor Gavin Newsom and artist Maya Lin. Meanwhile, Academy Executive Director Greg Farrington was chosen by Google as one of San Francisco's luminaries and asked to highlight his favorite haunts in the city. Farrington's picks, which are marked on Google Maps with an appropriately-designed penguin pin, include Books Inc. in Laurel Village and the Academy's own restaurant, The Moss Room.



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Photo: Kevin Twomey

Prepare to be Scared



The Death's head hawkmoth, best known for its starring role in *Silence of the Lambs*, is just one of the frightening research specimens that will be on display throughout the month of October in honor of Halloween (see page 13 for more details). This nocturnal species is commonly observed raiding beehives for honey—it escapes undetected by mimicking the scent of the honey bees.